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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,986	01/04/2005	Lorenzo Costa	39509-210193	3210
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VENABLE LLP P.O. BOX 34385 WASHINGTON, DC 20043-9998			EXAMINER ZIMMER, ANTHONY J	
			ART UNIT 1709	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/519,986	<b>Applicant(s)</b> COSTA ET AL.	
	<b>Examiner</b> Anthony J. Zimmer	<b>Art Unit</b> 1709	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01/04/2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/14/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of the Claims***

1. Claims 1-10 are pending and are subject to the examination.

### ***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Italian Application No. NO2002A000010, filed on 12 July 2002.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on 14 April 2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement was considered by the examiner.

### ***Claim Objections***

4. Claim 3 is objected to because of the following informalities: There is a misspelling, "alkoxyde" should be "alkoxide." Appropriate correction is required.
5. Claim 6 objected to because of the following informalities: It is unclear to what the mentioned "supercritical conditions" apply in the context of the claim. A suggested

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correction would be "supercritical conditions of xenon" or an explicit mention of the conditions intended. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 2-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "conditions suitable for hydrolysis/condensation" in claims 2 and 6 renders the claims indefinite. The term "conditions suitable for hydrolysis/condensation" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The dependent claims of claims 2 and 6, respectively claims 3-5 and 7-9, are rendered indefinite because of the use of the term "conditions suitable for hydrolysis/condensation" in claims 2 and 6.

The term "higher than" in claim 8 is a relative term which renders the claim indefinite. The term "higher than" is not defined by the claim, the specification

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does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "higher than" in claim 9 is a relative term which renders the claim indefinite. The term "higher than" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Therefore, claims 2-9 are rejected under 35 U.S.C. 112, second paragraph.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
10. Claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417, hereafter R1).

R1 teaches a process for the preparation that teaches exchanging the liquid phase of the hydrogel (aquagel) with a solvent, then exchanging the solvent with liquid carbon dioxide, and subsequently removing the carbon dioxide under supercritical conditions for carbon dioxide, see claim 1 and 8 of R1. R1 fails to teach using xenon.

The use liquid carbon dioxide to displace the liquid in a gel was an improvement over the prior art as it safe/non-flammable and has a relatively low critical temperature (31.1°C) compared to previously used exchange fluids, therefore requiring less energy to remove, see R1 column 1 lines 40-47. It has been a recognized problem in the art that this liquid carbon dioxide process has the drawbacks of requiring the use of an additional solvent since carbon dioxide and water are poorly miscible fluids and requiring laborious washing of the gel; see evidentiary references US5565142 column 2 lines 51-57, US7073349 column 3 lines 23-28, and US5270027 column 1 lines 47-52. Since lists of known substances and their critical temperatures were known at the time of the invention, for example see Dean pages 6.142-6.158—in PTO 892, it would have been obvious to one of ordinary skill in the art at the time of the invention to try using any of the finite number of known substances with a critical temperature

similar to or especially less than that of carbon dioxide, including xenon. Other examples include ethylene ( $T_c = 9.3^\circ\text{C}$ ), and trifluoromethane ( $T_c = 25.8^\circ\text{C}$ ). Especially when considering common industrial factors such as flammability, toxicity, and environmental hazards xenon becomes a more attractive option as xenon was and is well known to be very unreactive, inflammable, and environmentally friendly. As much success has been seen using different non-protic, water miscible liquids in the regard of this invention (for example see WO 02/04370 pages 11-12) one of ordinary skill could have pursued the above mentioned options with a reasonable expectation of success.

Thus, it would have been obvious to a person of ordinary skill in the art to try using the finite number of known substances, including xenon, with critical temperatures similar to or especially less than that of carbon dioxide in order to improve the aerogel forming process, as a person with ordinary skill has good reason to pursue known options within his or her technical grasp. The success of this invention is likely not the result of innovation, but of a combination of ordinary skill and common sense.

In regard to claim 10, R1 fails to teach recovering the exchanged solvent (xenon in the case of the instant claim) from the exchanging step. However it would have been obvious to one of ordinary skill in the art to recover the exchanged solvent, as it was common knowledge in the art at the time of the invention that reusing a substance results in the consumption of less of that

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substance. One of ordinary skill in the art would have been motivated to recover the exchanged solvent as when consumption of a substance decreases so does the product cost.

Therefore, claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417).

11. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417, hereafter R1) as applied to claim 1 above in view of Cogliati et al. (US5207814, hereafter R2).

In regard to claim 2, 3, and 4 R1 fails to teach forming an aquagel prior to the exchanging step (as required by claim 2) wherein the precursor to the aquagel is an alkoxide with the formula shown in claim 3, or more particularly wherein the precursor is tetramethoxysilane  $[(\text{CH}_3)_2\text{Si}(\text{OCH}_3)_2]$  or tetraethoxysilane as required by claim 4.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify R1 as applied to claim 1 above further in view of R2 as R2 teaches a process of forming an hydrogel (aquagel) from an alkoxide under conditions leading to hydrolysis and gel forming (condensation), see claim 1 of R2. In particular R2 teaches using both tetramethoxy silane and tetraethoxy silane, see claim 4 of R2.



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In regard to claim 5, it was common knowledge in the art the time of the invention to perform the hydrolysis in the presence of hydrochloric acid, nitric acid, or acetic acid; see R2 column 3 lines 3-8.

One of ordinary skill in the art would have been motivated to modify R1 in view of R2, as an aquagel is necessary to make an aerogel and R2 is a known method of producing the aquagel.

Therefore, claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417) in view of Cogliati et al. (US5207814).

12. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417, hereafter R1) in view of Cogliati et al. (US5207814, hereafter R2).

In regard to claim 6, see claim 1 rejection above for the limitations of steps b.) and c.), but R1 fails to teach forming an aquagel prior to the exchanging step (as required by part a.)).

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify R1 in view of R2 as R2 teaches a process of forming an hydrogel (aquagel) from an alkoxide under conditions leading to hydrolysis and gel forming (which the examiner equates to condensation), see claim 1 of R2.

One of ordinary skill in the art would have been motivated to modify R1 in view of R2, as an aquagel is necessary to make an aerogel and R2 is a known method of producing this starting material.

In regard to claim 7, R1 teaches adding carbon dioxide in liquid form in the exchange step above its critical pressure, see column 2 lines 13-19. It was well known in the art that in order for a fluid to be a liquid at a pressure above its critical pressure the fluid must be at a temperature below its critical temperature, therefore R1 inherently teaches performing the exchange step below the critical temperature of the exchange fluid. Since the critical properties of a fluid are dependent on the fluid itself and since it would have been obvious to substitute carbon dioxide with xenon—see above—(which was well known to have a critical temperature of 16.6°C) it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the known methods in the context of using xenon, i.e. performing the exchange step below the critical temperature of 16.6°C. Also, since it was well known that water freezes at 0°C, which would cause the predictable result of causing the exchange to fail since the water in the gel would be solid, it would have been obvious to one of ordinary skill in the art to perform the exchange process above 0°C.

In regard to claims 8 and 9, R1 teaches removing carbon dioxide at supercritical conditions, see claim 8 of R1. Since the critical properties of a fluid

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are dependent on the fluid itself and since it would have been obvious to substitute carbon dioxide with xenon—see above—(which was well known to have a critical temperature of 16.6°C and a critical pressure of 58.4 bar) it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the known methods in the context of using xenon, i.e. remove xenon at a temperature greater than 16.6°C, and a pressure greater than 58.4 bar.

Therefore, claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graser et al. (US4667417) in view of Cogliati et al. (US5207814).

### ***Conclusion***

13. In sum claims 1-10 are rejected and no claim is allowed.

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Zimmer whose telephone number is 571-270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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VICKIE Y. KIM  
SUPERVISORY PATENT EXAMINER